ORIGINAL

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Lon C. Levin
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October 2, 1996

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

William F. Caton, Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, DC 20554

Re: Pioneer's Preference Requests for the Satellite DARS
IB Docket No. 95-91
Gen. Docket No. 90-357
RM No. 8610
PP-24, -86, and -87

DOCKET FILE COPY ORIGINAL

Dear Mr. Caton:

Pursuant to the Public Notice of September 30, 1996 (DA 96-1650), American Mobile Radio Corp. submits the following documents in opposition to the pioneer's preference requests:

1. A technical analysis of the pioneer's preference request of Satellite CD Radio, prepared by William B. Garner, AMRC Chief Scientist.

2. A September 18, 1996 letter from AMRC to John Stern, International Bureau. The letter notes that, although it does not claim an award, AMRC itself has been a pioneer in the development of DARS. Among other things, this is demonstrated by an excerpt from comments filed in 1991 by American Mobile Satellite Corp., AMRC's parent corporation, in which AMSC was the first to identify and propose an S-band allocation to satellite-based DARS.

AMRC opposes the grant of a pioneer's preference to any of the applicants, for the following reasons:

1. The concept of satellite-based DARS did not originate with any of the pioneer's preference applicants.

2. The particular technical designs that have been proposed by the pioneer's preference applicants are not innovative; at most, they represent routine adaptations of pre-existing technology.

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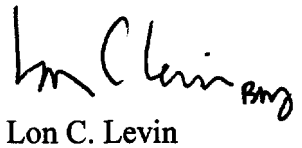
AMRC urges the panel to impose a heavy burden on the applicants and recommend against the award of any preference. Innovation is routine in the satellite industry. Virtually every new communications satellite that is built incorporates new innovations in its design. New versions of existing services are constantly being developed. (There were proposals to use AMSC's MSS system for DARS at around the same time as the first applications to develop dedicated DARS systems.)

A pioneer's preference cheapens the innovation that characterizes other satellite development efforts and wastes government and private sector resources that could be better spent on the licensing of bona fide applicants. Particularly now, when it appears that there might not be sufficient spectrum available for all four applicants' systems, it would be grossly unfair for the licensing decisions to be made on the basis of exaggerated claims of innovation.

The use of pioneer's preference awards is in disfavor. Indeed, this panel is likely to be the last of its kind. The panel should write the appropriate epitaph for pioneer's preference requests by denying those before it in this proceeding.

Very truly yours,



Lon C. Levin
Vice President
American Mobile Radio Corporation

cc: Rosalee Chiara
Dan Phythyon
Ronald Repasi
Rodney Small
John Stern
Peter A. Tenhula

TECHNICAL ANALYSIS

Introduction

Satellite CD Radio, Inc. has applied for a pioneer's preference for its proposed satellite Digital Audio Radio Service system, listing several technical aspects of its system design in support of the application. In fact, some of these technical elements are no longer included in SCDR's system design and the others are not truly innovative. Thus, a pioneer's preference is not justified based on the technical record.

Discussion

Spatial and Frequency Diversity

SCDR claims in its 1993 Supplement[1/] that it has pioneered seamless satellite DARS service through satellite spatial and frequency diversity in which each of two spatially separated satellites carry the same information but on different non-overlapping frequencies. In its 1996 *ex parte* letters to the FCC, it changed its design, abandoning the frequency diversity approach and adopting a CDM co-frequency design.[2/]

Space diversity is in no way a new concept. It has been used for many years in terrestrial microwave systems and HF radio systems. Cellular analog and digital systems routinely use diversity combining at cell sites; in fact, cellular CDMA systems use the capability for soft handoff between cells. As far as satellite systems are concerned, all of the Big Leo CDMA-based systems employ some form of spatial diversity. Hence, spatial diversity is not innovative; SCDR has simply taken an old technology and applied it to their system design.

In its original application, SCDR emphasized the importance of frequency diversity as an integral part of its design. Now, however, SCDR has concluded that co-frequency CDM is

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1/ "Supplement to Pioneer's Preference Request" (1/23/92) & (6/2/93).

2/ "Ex Parte Submission of Satellite CD Radio, Inc." (3/22/96) & (3/29/96).

superior and recently adopted it. Thus, frequency diversity can no longer be claimed to support its pioneer's preference application.

Satellite System Integration Advances

In its 1993 Supplement, SCDR claims that it should be granted a pioneer's preference for its satellite system integration advances. In particular, it cites the use of small planar array technology antennas and the use of perceptual audio coding.

Small planar array antennas of this type have been in use for years on aircraft and embedded in commercial products such as GPS receivers. In fact, in SCDR's Opposition of December 1, 1992, Seavey Engineering states "our company has designed and produced many antennas of this type. We have amassed a significantly body of test data on these antennas' properties."[3/] The type of small planar array antenna described by SCDR is neither new nor innovative.

Perceptual Audio Coding was under development by AT&T before SCDR was involved, and continued its development independently of any activity by SCDR as evidenced by technical articles published during that time period. SCDR has merely adopted a technology developed by others.

Neither the use of a well developed antenna technology nor of PAC supports the claim that the integration of these two devices significantly advanced satellite systems integration.

High Quality, Low Cost Satellite DARS

SCDR claims that its innovations enable introduction of high quality, low cost satellite DARS, with the implication that no other system is capable of doing so also. It claims that their

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3/ 'Opposition to Petitions to Deny and Response to Comments' (12/1/92), attached letter from Seavey Engineering Associates to Satellite CD Radio, November 23, 1992.

innovations took the DARS concept from being a terrestrial gap filler to seamless universal coverage, is spectrum efficient and lowered receiver and service costs.

Originally SCDR filed for a combined satellite/terrestrial system, citing the need for a terrestrial component to fill in difficult areas such as urban canyons. Then in the 1993 Supplement, it apparently dropped the idea of terrestrial repeaters, citing the superior propagation handling properties of their space/frequency diversity approach. Then in its 1995 Comments and Reply Comments[4/], SCDR again backed the concept of terrestrial repeaters using CDM. It is evident from these events that SCDR discovered that its frequency diversity approach would not work well in a hybrid system, which shows that their "original innovation" claim was misplaced.

SCDR's original claim was that its proposed 30 CD channel duel frequency plan was spectrally efficient because it took only 16 MHz of spectrum. But in its shift to CDM, it has found it can get at least 30 CD channels in 12.5 MHz. Hence, its original claim of spectral efficiency is not borne out by its own statements and conclusions.

As far as the lower costs argument is concerned, all of the applicants will offer services and equipment at prices competitive with SCDR and with one another. SCDR therefore has not shown anything in this regard that distinguishes itself from the other applicants.

Conclusion

SCDR has borrowed concepts from various sources, putting them together and claiming innovation with the result. The original concept has changed in a major way with the dropping of frequency diversity in favor of co-frequency CDM diversity, rendering the 'originality' argument invalid. Moreover, the other applicants have shown that there are other ways to

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4/ "Comments of SCDR" (9/15/95) & "Reply Comments of SCDR" (10/13/95).

provide comparable service at competitive prices. SCDR does not deserve a pioneer's preference on the basis of the technical record.

* * *

I, William B. Garner, hereby certify that I have prepared the foregoing Technical Analysis of SCDR's Pioneer's Preference Request, and that the analysis is true and correct to the best of my knowledge and belief.

William B. Garner
Chief Scientist
American Mobile Radio Corp.

Date: October 2, 1996

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Lon C. Levin
Vice President and Regulatory Counsel

September 18, 1996

By hand delivery

John Stern
International Bureau
Federal Communications Commission
2000 M Street, N.W.
Washington, D.C. 20554

Re: Satellite DARS/Pioneer Preference Review Panel

Dear John:

American Mobile Radio Corporation ("AMRC") supports the requests by counsel for Primosphere (September 17, 1996) and DSBC (September 13, 1996) that the Commission provide the peer review panel considering DARS pioneer's preference requests all relevant documents and complete information about the current design of the relevant satellite systems.

AMRC also wants to clarify a point raised by Melvin Barmat in DSBC's recent filing, in response to Satellite CD Radio's claim that it deserves credit for obtaining the international spectrum allocation for satellite DARS in the S band. Mr. Barmat suggests that the allocation was not difficult to secure because it is country-specific, and that the credit should go to U.S. government employees at the conference. AMRC notes further that AMRC's parent corporation, American Mobile Satellite Corporation, is the entity that first identified and proposed the allocation of the S-band to satellite-based DARS. *See* Supplemental Comments of AMSC in Gen. Docket No. 89-554 (February 21, 1991) (a copy of the relevant pages is attached). AMSC can also claim credit as a long-time supporter of satellite-delivered audio services. *See* Comments of AMSC in Gen. Docket No. 90-357 (November 13, 1990).

Although AMRC does not seek a pioneer's preference for itself, AMRC is proud of its own pioneering efforts in the development of DARS. It considers its efforts and those of the other applicants, however, as simply a part of its business and not something that warrants preferential treatment.

Please provide copies of this letter and the attachments to the review panel members in time for their consideration.

Very truly yours,

Lon C. Levin
Vice President
American Mobile Radio Corporation

cc: Office of the Secretary
All parties of record

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
An Inquiry Relating to Preparation for the International Telecommunication Union World Administrative Radio Conference for Dealing With Frequency Allocations in Certain Parts of the Spectrum	)	GEN Docket No. 89-554

SUPPLEMENTAL COMMENTS
OF
AMERICAN MOBILE SATELLITE CORPORATION

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February 21, 1991

allocation, AMSC proposed as an alternative uplink the 1260-1300 MHz band. The 1260-1300 MHz band is relatively lightly used in North America, primarily for radar, amateur and spaceborne active sensor operations. The Amateur Radio Relay League ("ARRL") opposes an MSS allocation in the 1260-1300 MHz band on the grounds that MSS would interfere with amateur operations in the band, which are carried out pursuant to a secondary allocation. AMSC appreciates that MSS systems are likely to preclude the operation of amateur systems. Nonetheless, such an allocation may be required if there is to be sufficient spectrum for the development of MSS. Another acceptable alternative uplink to be paired with the 1485-1525 MHz downlink is the 1850-1890 MHz band.[5/]

B. 1485-1525 MHz (downlink)

Proponents of a Broadcast Satellite (sound) Service ("BSS (sound)") continue to oppose an MSS allocation in the 1485-1525 MHz band, stating that the band instead should be reallocated for their use.[6/] Satellite CD Radio ("SCDR") claims that digital audio radio cannot operate in the 2390-2450 MHz band, which was proposed by the Commission as an alternative to the 1.5 GHz band. According to SCDR, Industrial, Scientific and Medical ("ISM")

5/ See Third Interim Report of Ad Hoc Group C of IWG-2, at 15 (February 14, 1991); Comments of Comsat at 22-25.

6/ AMSC notes that the Aerospace and Flight Test Radio Coordinating Council, which represents existing users of the band, did not file reply comments.

operation in the 2400-2500 MHz band will cause unacceptable interference to digital radio receivers operating in the same band.[7/]

Accepting arguendo that the 2400-2500 MHz band is not practical for a BSS allocation, other possible allocations between 0.5 GHz and 3 GHz should be evaluated in an attempt to resolve the conflict between BSS and MSS interests.[8/] As one such option, AMSC suggests that an exclusive, primary allocation for

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7/ Reply Comments of SCDR at 5-6; See also Comments of Japan Electrical Manufacturers' Association, Reply Comments of Stanford Telecom; Comments of Hitachi.

In its Reply Comments, SCDR also argues that MSS does not need additional spectrum. SCDR states that 50 percent of L-band MSS demand is non-voice and can be served readily by non L-band MSS systems. SCDR also states that Ka-band (20/30 GHz) spectrum will be available soon enough to relieve any congestion. SCDR's position is without merit. None of the alternatives suggested by SCDR will reduce the need for additional MSS spectrum in the 1-3 GHz range. Most of the alternative systems mentioned by SCDR are non-voice systems, with very low capacity and data rates. These systems are designed to serve occasional users with limited needs, so they have virtually no impact on the spectrum requirements for high throughput voice and data systems such as that of AMSC. Motorola's Iridium proposal is the only exception, since it too would provide voice services. Nonetheless, Motorola's system would not relieve any spectrum congestion, since it is no more efficient than AMSC's system and it would also require spectrum in the 1-3 GHz range. See AMSC Reply Comments, Technical Appendix, at Exhibit 6. Also, contrary to SCDR's claims, the Ka-band does not provide a solution to the current spectrum shortage. The technology does not yet exist to effectively use Ka-band for Mobile Satellite Service. See Comments of AMSC, File Nos. 54/55-DSS-P/L-90 (November 13, 1990).

8/ For example, CEPT, an organization representing European PTTs, has recommended a BSS (sound) allocation in the 2570-2620 MHz band. See Fourth Interim Report of Ad Hoc Subgroup B on Satellite and Complementary Terrestrial Sound Broadcasting, at Appendix B (February 14, 1991).

BSS be made in the 2368-2400 MHz band.[9] In the United States, the 2310-2390 MHz band is allocated on a primary basis to Mobile and Radiolocation service, and on a secondary basis to Fixed service, and is used mainly for aeronautical telemetry operations. The 2390-2450 MHz band is allocated to Radiolocation service on a primary basis and Amateur service on a secondary basis.

The 2368-2400 MHz band would be suitable for a BSS allocation because the service would not suffer interference from microwave ovens operating in the 2400-2500 MHz band.[10] When NASA studied the problem of interference from microwave ovens to BSS receivers operating at the same frequencies, it concluded that BSS receivers would need to be separated from microwave ovens by as little as 0.1 km and, in the case of some microwave ovens, as much as 16.7 km.[11] By locating BSS immediately adjacent to the ISM band, however, required separation distances can be reduced dramatically. Out-of-band microwave oven emissions (i.e., emissions below 2400 MHz or above 2500 MHz) are

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9/ This band is part of a larger band (2300-2450 MHz) allocated internationally in Regions 2 and 3 on a primary basis to the Fixed, Mobile and Radiolocation services and on a secondary basis to Amateur service. In Region 1, only Fixed service is primary; Amateur, Mobile and Radiolocation services are secondary.

10/ AMSC's recommendation for an allocation of 32 MHz to BSS (sound) is consistent with the amount of spectrum considered by the Commission for exclusive BSS use in the 1.5 GHz band.

11/ "Interference to BSS(Sound) Reception from Industrial, Scientific, and Medical Emissions in the Band 2400-2500 MHz," Doc. U.S. JIWP WARC-92-93, February 4, 1991.

required to attenuate by about 60 dB, which, using NASA's methodology, reduces the required separation distances substantially. In other words, in the case of a typical microwave oven that meets standards, a BSS receiver in the 2368-2400 MHz band would be able to operate without interference with a separation of as little as a few inches. An occasional oven, (e.g., an oven operating out of compliance with standards) may require a separation distance of several yards. Even in the worst case, it is reasonable to expect that additional attenuation provided by nearby objects or intervening walls means that microwave ovens will not cause interference to BSS receivers in any room other than the kitchen, and in many cases there will be no interference even in the kitchen.

While BSS can make use of an allocation in the bands between 2 GHz and 2.5 GHz, there would serious problems with implementing the use of these bands for Mobile Satellite Service downlinks.[12/] This is the case because of intermodulation that is likely to result from the use of these frequencies by MSS systems that also use either the C band (4/6 GHz) or the Ku band (11/13 GHz) for feeder links. MSS downlinks in the 2-2.5 GHz range are likely to combine with MSS feeder links in the space-to-Earth direction to create spurious signals that have the same frequency as MSS

12/ MSS systems, however, can use frequencies in the 2-2.5 GHz range for uplinks. Thus, for example, AMSC has proposed a new MSS uplink allocation at 2165-2200 MHz. The 2390-2425 MHz band also may be a suitable MSS uplink band. See Third Interim Report of Ad Hoc Group C of IWG-2, at 15 (February 14, 1991); Comments of Comsat at 27-29.

feeder links in the Earth-to-space direction. Without drastic design and testing efforts, the feeder links in the Earth-to-space direction would be interfered with by the spurious signals from intermodulation. This problem of intermodulation is one that is widely recognized in the satellite construction industry and can require millions of dollars and months of additional construction time to correct. In contrast, BSS systems have only one set of uplink and downlink frequencies and, therefore, do not face any such problems with intermodulation.

One benefit of an allocation to BSS from the 2310-2390 MHz band is that the impact on aeronautical telemetry users of such an allocation will be far less than that of a similar allocation from the 1425-1525 MHz band. While both bands are used for aeronautical telemetry, the 2310-2390 MHz band is much more lightly used. Furthermore, AMSC is proposing a BSS allocation of only 22 MHz from the 2310-2390 MHz band, rather than the 32 MHz being proposed by the Commission for BSS in the 1435-1525 MHz band. (The other 10 MHz in AMSC's proposal would come from the adjacent 2390-2400 MHz band which is allocated to, and lightly used by, radiolocation and amateur services.) AMSC's proposal is also that a 40 MHz portion of the 1435-1525 MHz band will be allocated to MSS (1485-1525 MHz), but it has been shown that MSS can share with aeronautical telemetry, whereas BSS and aeronautical telemetry cannot share the same spectrum.[13/]

13/ See Comments of AMSC, RM-7400 (August 20, 1990); Further Reply of AMSC, RM-7400 (October 18, 1990).

CERTIFICATE OF SERVICE

I, Cindi Smith Rush, a secretary to the law firm of Fisher Wayland Cooper Leader & Zaragoza L.L.P., hereby certify that on this 2nd day of October, 1996, I served a true copy of the foregoing "Letter" of AMSC Subsidiary Corporation by first class United States Mail, postage prepaid, upon the following:

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